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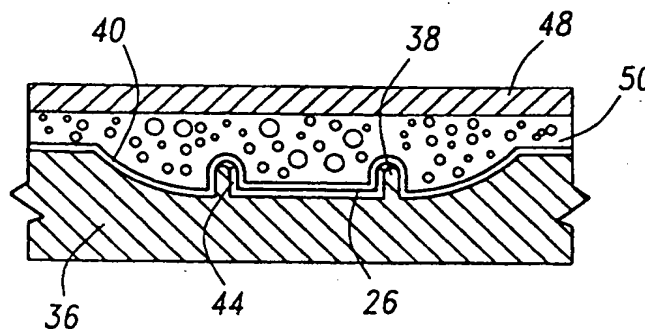
## Published

With international search report.  
With amended claims.

(54) Title: METHOD OF SECURING DECORATIVE INSERT TO UNDERLYING PLASTIC SKIN FOR TRIM PANEL

## (57) Abstract

An improved method of forming a vehicle trim part includes the initial step of securing an insert (26) to a vinyl-skin (32) in a vacuum mold (22). The cloth insert (26) is attached to the outer face of the skin (32), and the two are then placed into a foam mold (36, 48) as a single preform. In this way, if the cloth (26) is improperly connected to the skin (32), the part can be identified as scrap before foam (50) is injected to complete the part. Since the preform (35) is moved into the foam mold, foam (50) is injected behind the part. Since the preform (35) is positioned within the mold as a single part, the invention more accurately positions the insert (26) and skin (32) relative to the mold prior to foam injection. Again, this improves the quality and appearance of the vinyl part.



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## METHOD OF SECURING DECORATIVE INSERT TO UNDERLYING PLASTIC SKIN FOR TRIM PANEL

### 5                                    BACKGROUND OF THE INVENTION

This invention relates to a simplified and improved method for securing a decorative insert to an underlying plastic skin for a trim panel.

In the prior art, vehicle trim panels such as door panels are often formed to  
10    have decorative inserts such as a cloth insert secured to a plastic skin. A foam backing is formed behind the plastic skin. The prior art has manufactured these components in a number of different methods.

With one commonly used method, the cloth insert is first secured to a rear (or non-exposed) face of the skin. The decorative face of the cloth actually initially  
15    faces the back of the skin. The cloth and skin are welded together as by dielectric welding at the perimeter of the insert. The skin is then removed within the weld, exposing the cloth. The combined cloth and skin are then placed in a foam mold, and the foam is injected into the mold rearwardly of the skin and cloth. While this prior art method has gained wide success, it would be desirable to utilize a bond  
20    type other than the dielectric weld.

One other method utilizes separate placement of the decorative cloth insert and the skin into the foam mold, prior to foam being injected into the mold. Thus, the insert is first placed in the mold, the skin is then placed over the insert, and the foam is then injected into the mold. While this method does typically result in a  
25    secure bond between the insert and the skin, placement of the insert may sometimes be inaccurate. Moreover, there is a certain percentage of scrap wherein the insert is not properly secured or positioned on the skin. With this prior method, scrap

cannot be identified until after the foam has been injected and the final part has been completed. It would be desirable to identify an improper connection of the cloth to the skin earlier in the process, and before injecting the foam.

### SUMMARY OF THE INVENTION

5 In a disclosed embodiment of this invention, a separate mold is utilized to initially secure the insert to the outer face of the skin. The insert is secured to what will become the outer face of the skin by some means in a vacuum form mold. An adhesive may be utilized, or the insert could be simply secured to the skin, since the skin is preferably at a relatively high temperature when placed in the mold along  
10 with the cloth. In one embodiment, the vacuum form mold is provided with a cavity, and a plug moves with the insert forcing the insert and skin into the cavity.

Once the insert has been secured to the skin, the combined skin and insert are removed from this first mold. The combined skin and insert are then placed as a preform into the foam mold. Preferably, a tuck blade is formed on the foam mold  
15 which surrounds the entire periphery of the insert. The insert is located within the tuck blade. The tuck blade forms a tuck seam around the edges of the insert, and forces the insert back into the skin.

Since the skin and insert are placed into the mold as a single preform, one can check the propriety of the preform prior to injecting the foam behind the skin.  
20 Thus, there will be no unnecessary scrap after molding. In addition, the improved method ensures the proper placement of the insert and skin within the mold. The invention is also in that the bond between the insert and the skin is not exposed to the foam.

Once the preform is placed in the mold, foam is injected behind the skin to complete the trim panel. The combined trim panel is then removed from the mold.

With the instance invention, not only is the manufacture of a trim panel greatly simplified over the prior art methods, but the method provides reduced scrap, and more accurate formation of the trim panel. This is an improvement over the prior art methods.

These and other features of the present invention can be best understood from the following specification and drawings, of which the following is a brief description.

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### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 shows the first step in the formation of a trim panel

Figure 2A shows a subsequent step in the formation of a trim panel.

Figure 2B shows a step subsequent to the Figure 2A step.

Figure 3A shows another subsequent step.

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Figure 3B is a detail of the Figure 3A structure.

Figure 4 shows another subsequent step.

Figure 5 shows the final trim product.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

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Figure 1 shows assembly 20 for forming a trim panel preform. This type of preform is also known as cover stock or cover material. A male vacuum mold 22 is utilized in combination with a plug assist 24. Plug assist 24 carries an insert 26, which may be a decorative cloth insert. Other type inserts, such as leather, plastic, etc. also benefit from this method. Vacuum mold 22 includes a vacuum

source as shown schematically by openings 28. A well 30 is also formed in mold 22. As is known, skin material 32, which is preferably vinyl, is heated in an oven, and is then brought above the mold 22. The skin is heated to a temperature on the order of 300°F. The plug 24 is then brought downwardly on the skin 32, with insert 26 brought against the skin 32. The plug 24 may include a source of air 34 such that it can blow the insert 26 onto the skin 32. The insert 26 may also be provided with an adhesive layer 26A. The adhesive may be one that is actuated by the heat of the skin 32 to secure the cloth 26 to skin 32. As shown in Figure 1, the face of the skin 32 which receives insert 26 is the decorative or outer face. The face of insert 26 which is secured to skin 32 is the face which is covered in its final state. The decorative surface of the insert 26 faces the plug 24. Typically, the skin 32 is initially formed on mold 22 first. Then plug assist 24 brings the insert 26 into the well, to secure it to the skin.

As shown in Figure 2A, the insert 26 has now been secured to the skin 32. The two materials are forced downwardly in the well 30 of the mold 22. Vacuum may assist in this formation.

As shown in Figure 2B, preform 35 has now been formed from the combined skin 32 and cloth insert 26, which is now secured to the skin 32. The layer, while secured together, are still very flexible.

As shown in Figure 3A, a foam mold tool 36 includes tuck blade 38 which preferably surround the periphery of insert 26. The preform 35 is placed into mold 36. The preform 35 shapes itself to the mold shape such as shown in 40. The outer face, or class A surface, now faces downwardly against mold 36. Insert 26 contacts

the mold, and skin 40 is behind the insert. However, at locations other than that of the insert, the skin 40 does contact the mold. As shown, portions 42 of the skin 40 bend around the tuck blades, and will form a well in the final trim part. The outer edges of insert 26 bend upwardly against the tuck blade 38 to form inner edges 44. As shown schematically, the mold 36 may be provided with vacuum openings 46 to assist in holding the skin 40 against the surface of the mold 36.

As shown Figure 3B, the tuck blade 38 is preferably relatively thin. It forms the edges 44 of the insert 26 upwardly. The skin 40 and portion 42 also bend around the tuck blade 38.

As shown in Figure 4, an outer mold portion or core half 48 is moved relative to mold 36 and foam 50 is injected between the two. Although the invention is typically used with foam, other polymers such as plastic may be used in some applications. The relative size of the foam is exaggerated, and the size of the final trim panel may actually be generally relatively thin in comparison.

As shown in Figure 5, the part 51 now includes the skin 40 having a shape from mold 36. Further processing may occur on part 51, although for purpose of this application, it will be considered a final part. Insert 26 is secured within the skin 40. A well 52 surrounds the insert 26 and is formed by the tuck blade 38.

With the present invention, since the preform 35 is inserted into the foam mold 36 already connected, one may easily ensure that the insert 26 is properly positioned within the mold 36. This improves the appearance and quality of the final part 51. In addition, since one can check the quality of the preform 35 before injecting the foam as shown in Figure 4, one does not need to wait to the Figure 4

step to identify scrap. If the insert 26 is improperly secured to the skin 32 at the preform stage, the preform itself can be discarded. This reduces the expense and waste that would occur if the error was not discovered until after the foam had been injected behind the skin. Also, there is no opportunity for the foam to penetrate the bond between the insert and the skin.

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A preferred embodiment of this invention has been disclosed, however, a worker of ordinary skill in the art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content of this invention.



CLAIMS

1. A method of securing a decorative insert to a plastic skin for a trim panel comprising the steps of:

5 1) securing an insert onto an outer face of a plastic skin material to form a preform;

2) then placing said preform into a polymer mold, with said insert and said outer face facing a surface of said polymer mold; and

3) then injecting a polymer behind said skin to form a trim panel.

10 2. A method as recited in Claim 1, wherein said preform is formed in a vacuum mold by securing said insert to said outer face of said skin.

3. A method as recited in Claim 2, wherein said vacuum mold is formed with a well and vacuum pull said skin downwardly into said well, said insert being forced into said well by a plug received between said plug and said skin, and said insert thus being secured to said skin.

15 4. A method as recited in Claim 3, wherein said insert is provided with an adhesive layer, and said skin is at an elevated temperature when placed in said vacuum mold, said temperature of said skin activating said adhesive to secure said insert to said skin.

20 5. A method as recited in Claim 1, wherein said polymer is foam, and portions of said skin remain between said foam and said insert.

6. A method as recited in Claim 1, wherein said polymer mold includes a tuck blade which surrounds an outer periphery of said insert, edges of said insert being bent toward said skin by said tuck blade, to form a well around the periphery of said insert in said skin.

5 7. A method as recited in Claim 1, wherein said insert is provided with a decorative cloth face which faces outwardly in said trim panel.

8. A method of forming a trim panel comprising the steps of:

1) providing a vacuum mold having a well, and a plug being sized to fit within said well, said plug being movable towards and away from said vacuum mold;

5 2) placing a skin material on said vacuum mold and over said well;

3) placing an insert between said plug and said skin material;

4) bringing said plug toward said skin material and into said well, said plug forcing said insert against said skin material;

10 5) removing a preform of said skin and said insert from said vacuum mold, and placing said preform into a polymer mold, said polymer mold including a tuck blade bending edges of said insert inwardly of said tuck blades to form a well around said insert in a vinyl part; and

15 6) injecting a polymer behind said skin and on an opposed side of said skin from said insert to form a trim panel.

9. A method as recited in Claim 1, wherein said insert is formed with an adhesive on a surface which is brought in contact with said skin material, said skin material being raised to an elevated temperature such that said skin material heats and actuates said adhesive layer to secure said insert to said skin material.

20 10. A method as recited in Claim 9, wherein said insert includes an outer cloth face which faces outwardly of an outer face of said skin in said trim panel.

11. A method as recited in Claim 8, wherein said plug is provided with a source of air, said air assisting in separating said insert from said plug, once said insert has been secured to said plug.

12. A method as recited in Claim 8, wherein said portions of said skin  
5 remain between said foam and said insert.

13. A method as recited in Claim 8, wherein said polymer is a foam.

## AMENDED CLAIMS

[received by the International Bureau on 4 June 1998 (4.06.98);  
original claims 1-13 replaced by new claims 1-11 (3 pages)]

1. A method of forming a trim panel comprising the steps of:

1) providing a vacuum mold having a well, and a plug being sized  
to fit within said well, said plug being movable towards and away from said  
vacuum mold;

2) placing a skin material on said vacuum mold and over said  
well;

3) placing an insert between said plug and said skin material;

4) bringing said plug toward said skin material and into said well,  
said plug forcing said insert against said skin material;

5) removing a preform of said skin and said insert from said  
vacuum mold, and placing said preform into a polymer mold, said polymer  
mold including a tuck blade bending edges of said insert inwardly of said tuck  
blades to form a well around said insert in a vinyl part; and

6) injecting a polymer behind said skin and on an opposed side of  
said skin from said insert to form a trim panel.

2. A method as recited in Claim 1, wherein said insert is formed with an adhesive  
on a surface which is brought in contact with said skin material, said skin material being  
raised to an elevated temperature such that said skin material heats and actuates said adhesive  
layer to secure said insert to said skin material.

3. A method as recited in Claim 2, wherein said insert includes an outer cloth  
face which faces outwardly of an outer face of said skin in said trim panel.

AMENDED SHEET (ARTICLE 19)

4. A method as recited in Claim 1, wherein said plug is provided with a source of air, said air assisting in separating said insert from said plug, once said insert has been secured to said plug.

5. A method as recited in Claim 1, wherein said portions of said skin remain between said foam and said insert.

6. A method as recited in Claim 8, wherein said polymer is a foam.

AMENDED SHEET (ARTICLE 19)

7. A method of forming a trim panel comprising the steps of:

1) providing a vacuum mold have a well, and a plug sized to fit within said well, said plug being movable towards and away from said vacuum mold;

5 2) placing skin material on said vacuum mold and over said well;

3) then, placing an insert between said plug and said skin material, said insert being on an outer face of said skin material relative to a bottom of said well;

10 4) then bringing said plug toward said skin material and into said well, said plug forcing said insert against said skin material;

5) removing a preform of said skin and said insert from said vacuum mold and placing said preform into a polymer mold; and

6) injecting a polymer behind said skin and at an opposed side of said skin from said insert to form a trim panel.

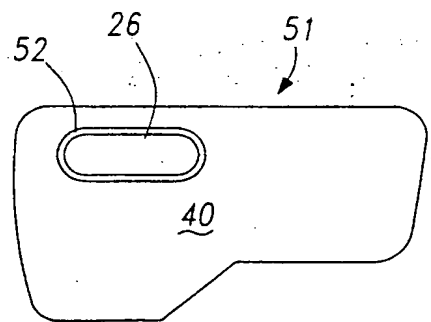
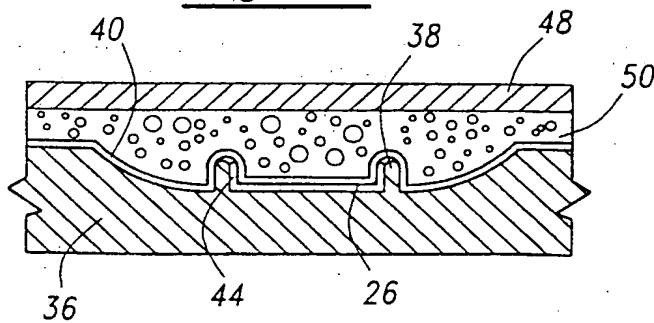
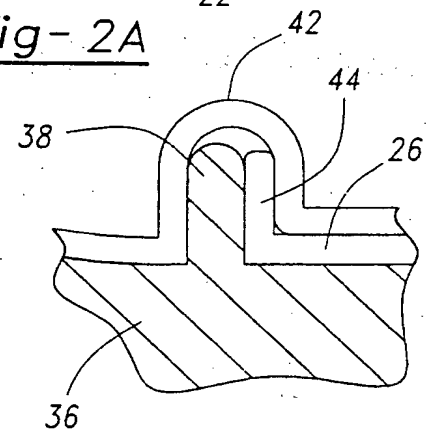
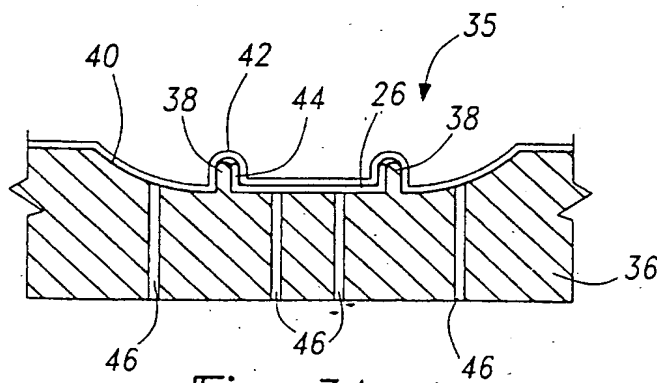
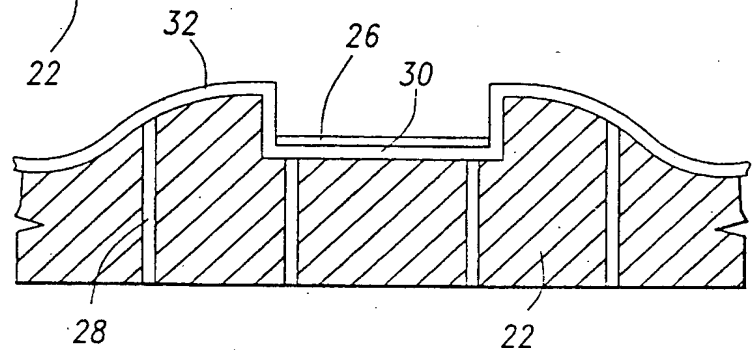
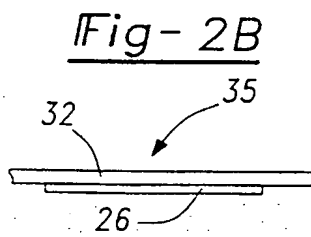
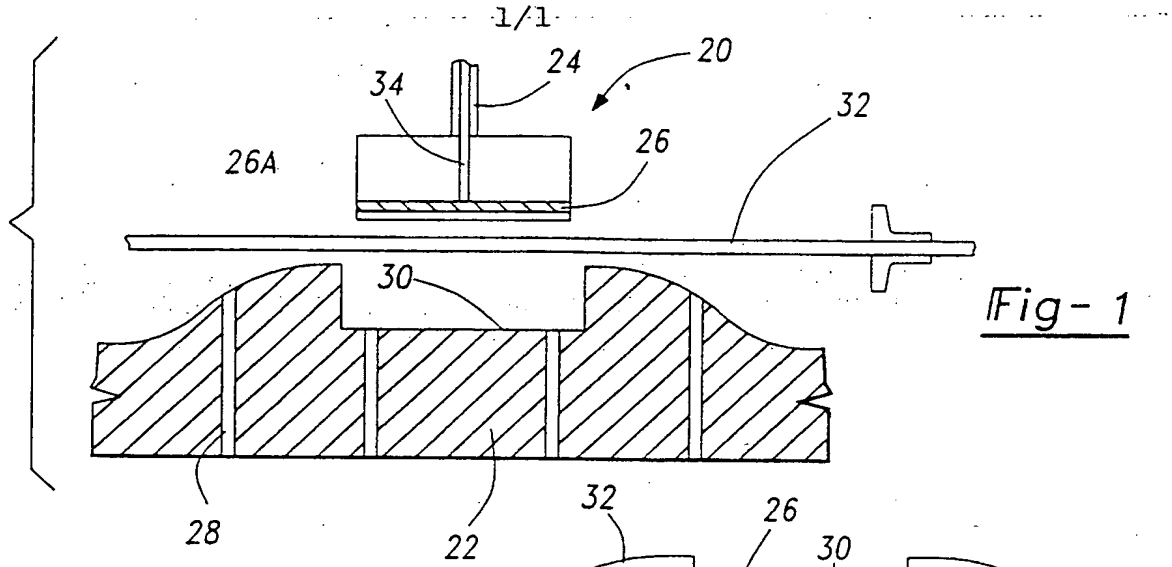
15 8. A method as recited in Claim 7, wherein an adhesive is deposited to bond said insert to said skin material.

9. A method as recited in Claim 7, wherein said insert includes an outer cloth face which faces outwardly of an outer face of said skin in said trim panel.

20 10. A method as set forth in Claim 14, wherein said insert is placed on said sheet and within said well prior to said plug being brought into contact with said insert.

11. A method as recited in Claim 8, wherein said insert is placed on said sheet and within said well prior to said plug being brought into contact with said insert.

AMENDED SHEET (ARTICLE 19)





# INTERNATIONAL SEARCH REPORT

International Application No

PCT/7/22896

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 B29C45/14

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 091 031 A (STRAPAZZINI VITTORIO) 25 February 1992 see the whole document	1,5-7 2,8,10, 13
X A	US 5 411 688 A (MORRISON CLARK ET AL) 2 May 1995 see the whole document	1,5-7 2,8,10, 12,13
A	DE 43 43 240 A (BAYERISCHE MOTOREN WERKE AG) 22 June 1995 see the whole document	1,6-8, 10,12
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Date of the actual completion of the international search

27 March 1998

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20/04/1998

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Inter. Application No  
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 96, no. 7, 31 July 1996 & JP 08 072079 A (ARACO CORP), 19 March 1996, see abstract ---	1,6-8, 10,12
A	PATENT ABSTRACTS OF JAPAN vol. 11, no. 196 (M-601), 24 June 1987 & JP 62 019419 A (MEIWA SANGYO KK), 28 January 1987, see abstract -----	6

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US97/22896

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5091031 A	25-02-92	CA 2041253 A	03-11-91
		JP 2019531 C	19-02-96
		JP 4128018 A	28-04-92
		JP 7049207 B	31-05-95
		US 5529742 A	25-06-96
		US 5340425 A	23-08-94
US 5411688 A	02-05-95	NONE	
DE 4343240 A	22-06-95	NONE	

